ISDS One Health Surveillance (OHS) Case Study

CASE STUDY TITLE

Developing a Transdisciplinary Database Template for Operationalization of One Health Surveillance for Japanese Encephalitis and Other Vector Borne Diseases in India

PROJECT/ACTIVITY TITLE

Identifying Sources, Pathways and Risk Drivers in Ecosystems of JE in an Epidemic-Prone North Indian District in 2011-13: An EcoHealth Perspective to Studying JE

CONTACT INFORMATION

NAME:	Elizabeth T. Rogawski[1], Pranab Chatterjee[2], Manish Kakkar[2]		
ORGANIZATION:	[1]University of North Carolina, Chapel Hill, [2]Public Health Foundation of India		
COUNTRY:	India		
Email:	manish.kakkar@phfi.org		

WHAT DOMAIN(S) DO YOU WORK IN?	__x_ Human health	__x_ Animal health	_x__ Environmental health
OHS AREA(S) OF FOCUS ADDRESSED BY CASE STUDY	__x_ Cross-Agency Communication and Collaboration	___ Training and Resources	_x__ Technologies and Methodologies
	___Other: _____		

PROBLEM DESCRIPTION (150 word maximum)

Summarize the problem/situation that was addressed with a OHS approach.

Vector borne diseases like Japanese Encephalitis (JE) result from the convergence of multiple factors, including, but not limited to, human, animal, environmental, and economic and social determinants. Thus, to combat these problems, it is essential to have a systematic understanding of drivers and determinants based on a surveillance system that systematically gathers and analyzes data emanating from across multiple disciplines. In India, where surveillance is primarily driven by a disease-driven approach, there is growing recognition of the need for a transdisciplinary framework for surveillance, but it has never been operationally formalized. A health system overly focused on human health outcomes, a policy environment that does not encourage transdisciplinary dialogue, a lack of capacity across sectors, and a surveillance system that fails to capture the breadth of data needed for an integrated, collaborative effort have stood as hurdles in operationalizing a OneHealth Surveillance mechanism in the Indian context.

ACTION TAKEN (500 word maximum)

Describe how the problem was addressed and how the action taken was measured. Please include a description of the collaborators and the data sources used.

A multidisciplinary team of JE experts, representing epidemiology, human health, veterinary public health, microbiology, GIS, social sciences, and entomology, was assembled to develop a conceptual framework. Literature reviews were conducted to fine tune the conceptual framework. A collaborative and iterative process was adopted to determine the datapoints that needed to be developed. This was further supported by exploratory formative research. Domains of inquiry were identified across disciplines through this process. Data points to address these domains through in-depth studying was developed using a transdisciplinary approach.

Once the transdisciplinary framework was developed the challenge was to develop a unique identifier that would help in constructing a relational database which could systematically organize data from various

sources: animal testing, human testing, questionnaire-based surveys, demographic data, GPS data, environmental and metereological data, and vector collection and entomological data. There further had to be provisions to categorize data collected over multiple rounds. Sera from human and pigs were tested using ELISA and PCR; an extensive questionnaire was deployed to identify risk behaviors, demographic factors, and understand exposure to known and putative risks; GPS based data was used to identify sites and associate it with data on land use and land cover, including information on water bodies and forests; vector collection was done following standardised protocols in the domestic biotope (indoor and around the house) and peri-domestic biotope (area around the village: an agro-climatic zone). Data from different rounds (pre-monsoon and monsoon, which indicates relation with the peak-transmission period) were tagged with round identifiers.

To construct this database, a Link ID based system was developed. A unique identifier was developed; it spanned multiple strata. The Link ID could identify data-points from a macro level (district or block) to a micro-level (individual). For example, a Link ID for a unique individual would consist of codes identifying the block, village, and village site, followed by the line number s/he figured in within the household roster. This unique identification system could not only allow data to be structured according to various strata, it would also allow for comparisons between strata and within strata. Also, since it allowed all the parameters to be included within the same data structure, it created a simple, yet comprehensive method to enter data within a unified database.

This template developed using a transdisciplinary database with unique Link IDs connecting data points from across different disciplines led to a holistic understanding of the drivers of a disease that has become a public health menace in India. It led to recognition of risk drivers and determinants which would have been impossible to pry out using a discipline-centric research approach. For example, recognition of changing biting behavior of mosquitoes, role of multiple cropping across seasons on disease incidence, presence of JE in both pig-owning and non-pig-owning villages and the role of biotopes in virus transmission could not have emerged from a discipline centric research approach.
Rigorous quality checks and monitoring measures were incorporated within this framework to ensure fidelity of the collected data.

FACILITATORS AND BARRIERS (100 words max each)

Please list and describe any factors that contributed positively to this project/activity.

A wide array of experts contributed to the development of the transdisciplinary database, ensuring an integrated, collaborative framework was followed. The database was developed using cheap and inexpensive tools (Microsoft Access) ensuring scalability and reproducibility in resource-restricted settings. Structuring a stratified Link ID system allowed for multiple analytical approaches, including provisions for within and between strata comparisons, which has been historically difficult to conduct. Adding codes for different rounds to the Link ID ensured that the template would also hold for longitudinal data, which is critical for successful surveillance. Additionally, a better understanding of missing data could bolster the process.

Please list and describe any factors that were a challenge or barrier to overcome.

Identifying transdisciplinary data points to include in the database was a challenge that required an exhaustive process including expert consultations, literature review, and advise from exploratory, formative research. This “front-end” approach taught us that it needed to incorporate a feedback loop which would help in making the database more accurate over time by including parameters that may have been missed in the initial stages. Finally, a common problem with many vector borne diseases and zoonoses, the relative paucity of discipline-specific experts and data driven OneHealth understanding of the disease, represents a challenge in developing a conceptual framework to guide the process.

LESSONS LEARNED (250 word maximum)

Please describe any lessons learned or best practices identified by this project/activity.

Despite the programmatic reluctance to develop a multidisciplinary surveillance system for zoonoses and vector borne diseases, this case study demonstrates that such a system can be developed and deployed on a large scale without additional burden on the system. It provides a better understanding of the multidisciplinary nature of risks related specifically to JE, and in general, to other vector borne diseases. By bringing together animal and human cases of disease, this template provides incentive for programmatic adoption. Not only that, it also provides a method for triangulation of identified cases with recognised risks from across different sectors. This study was carried out in a state that has regular outbreaks of JE or Acute Encephalitis Syndrome (AES) and contributes maximally to the national burden for these diseases. The data from this activity was used to provide policy inputs to the state government through policy briefs and meetings to help formulate appropriate strategies to combat this public health menace.

ADDITIONAL COMMENTS (75 words max)

Summarize the problem/situation that was addressed with a OHS approach.